

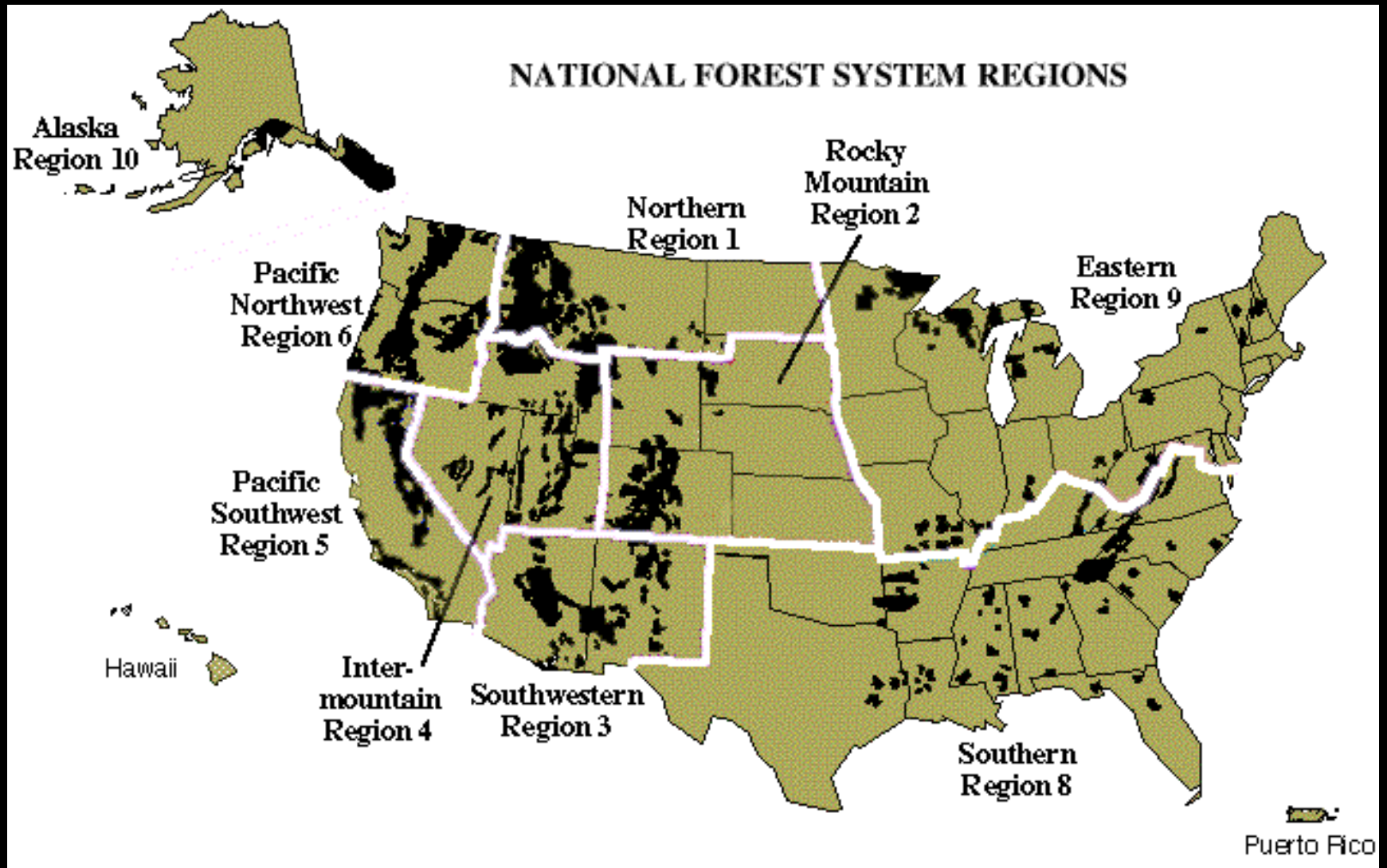


Introduction to USFS Remote Sensing Aircraft

Presentation to the Spring 2012
ICCAGRA Meeting 3/15/12

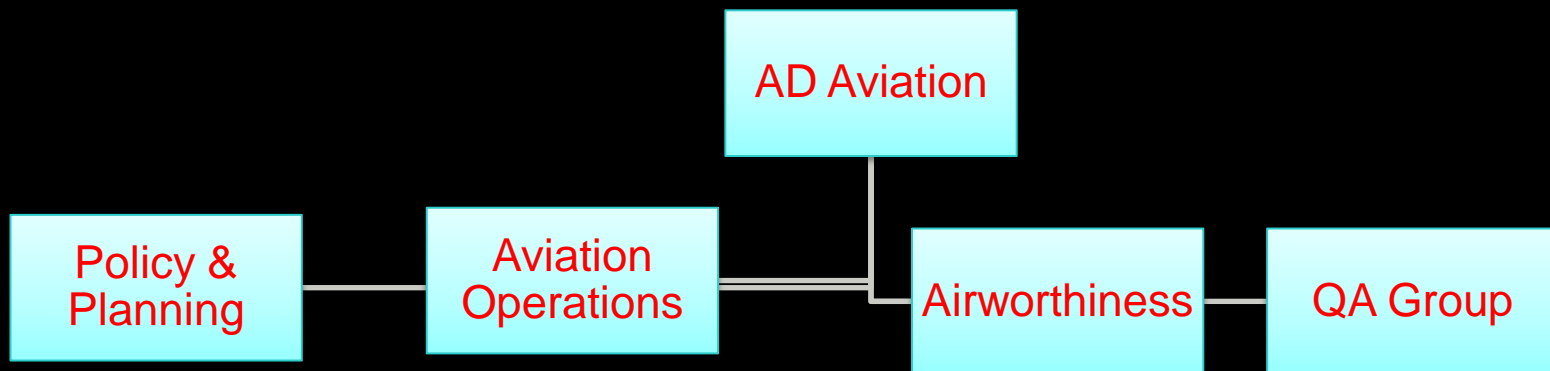


US Forest Service Organization



FS Aviation Organization

- Art Hinaman is the Asst. Director Aviation
- All FS aviation is under this deputy area.



Introduction

- Owns and operates 27 aircraft and helicopters
- Contracts with over 800 aircraft and helicopters annually
- Missions Include:
 - Fire surveillance
 - Aerial reconnaissance
 - Air Attack
 - Delivery of smokejumpers
 - Firefighter and cargo transport
 - Aerial delivery of retardant and water
 - Natural Resource Management
 - Research



FS Aircraft (owned)

AIRCRAFT MAKE	AIRCRAFT MODEL	TYPE H/F	N#	MANF. YEAR	REGION	AIRPORT/ BASE	USE
1Bell	206 B III	H	N106Z		1970R8	LZU	Proficiency/Training/RxFire
2Bell	AH-1F	H	N107Z	Uk	R5	RDD	Aerial Supervision Platform
3Bell	AH-1F	H	N109Z	Uk	R5	WJF	Aerial Supervision Platform
4Cessna	Stationair TU 206F	F	N111Z		1978R1	MSO	Command & Control
5Douglas	DC-3TP	F	N115Z		1944R1	MSO	Smokejumper
6Cessna	Stationair TU 206F	F	N126Z		1974R2	BJC	FHP R2
7Beechcraft	King Air 100	F	N127Z		1974R2	BJC	FHP WO
8Cessna	Stationair TU 206G	F	N136Z		1986R6	RDM	Resource
9DeHavilland	DHC-6 Twin Otter	F	N141Z		1984R4	MYL	Smokejumper
10Douglas	DC-3TP	F	N142Z		1944R4	MYL	Smokejumper
11DeHavilland	DHC-6 Twin Otter	F	N143Z		1974R4	MYL	Smokejumper
12Cessna	Citation 550	F	N144Z		2000R4	OGD	Infrared
13Aero Commander	500	F	N147Z		1964R4	OGD	Command & Control
14Beechcraft	King Air 90	F	N148Z		1969R4	BOI	Excess- approved for sale
15Beechcraft	King Air 200	F	N149Z		1985R4	OGD	Infrared
16Shorts	SD 330 Sherpa	F	N173Z	Uk	R6	RDM	Smokejumper
17Shorts	SD 330 Sherpa	F	N175Z	Uk	R5	RDD	Smokejumper
18Shorts	SD 330 Sherpa	F	N178Z		1985R6	RDM	Smokejumper
19Shorts	SD 330 Sherpa	F	N179Z		1985R1	MSO	Smokejumper
20Beechcraft	King Air 90	F	N181Z		1973R8	LZU	Leadplane/ASM
21Beechcraft	King Air 200	F	N182Z		1978R8	LZU	Command & Control
22DeHavilland	DHC-2 Beaver	F	N191Z		1956R9	ELO	Detection/Suppression/LEI
23DeHavilland	DHC-2 Beaver	F	N192Z		1959R9	ELO	Detection/Suppression/LEI
24DeHavilland	DHC-2 Beaver	F	N193Z		1957R9	ELO	Detection/Suppression/LEI
25DeHavilland	DHC-2 Beaver	F	N106FS		1952R10	JNU	Law Enforcement
26Piper	PA-18 Super Cub	F	N4340Z		1968R5	WJF	Wildlife - SNAMP
27Cessna	185F	F	N 4704A		1974R5	WJF	Wildlife - SNAMP

N149Z Specifications



Flight Rate - \$1040 per hour
Contact Clair Mendenhall
cmmendenhall@fs.fed.us

King Air 200

Primary Mission – Infrared Fire Mapping (April – October)

AirCell Datalink

Average 204 Kbs downlink

Continuous coverage CONUS at 10,000 AGL

Sensor Pod

Removable sensor pod with 12 in wide by 8 in wide sensor hole open to atmosphere

12 x12 access hatch allows aircraft to remain pressurized

N144Z Specifications



Cessna Citation Bravo

Primary Mission – Infrared Fire Mapping (April – October)

AirCell Datalink

Average 204 Kbs downlink
Continuous coverage CONUS
at 10,000 AGL

Sensor Bay

Port Side blister
Opening 18 in long 15 wide
Sensor bay 24 in long 17 wide

Flight Rate - \$1760 per hour
Contact Clair Mendenhall
cmmendenhall@fs.fed.us

PHOENIX System Installation – N144Z



Recent Forest Service TFRSAC-Related Activities

AUVSI Fire Fighting TTX
Dugway, UT
Sept 27-30, 2010

Hyperblimp
Evaluation
Grantville, UT
March 24, 2010

Small UAS
Evaluation
Ft. Pickett, VA
June 1-2, 2010

Rx Cadre
Eglin AFB, FL
June 1-2, 2010

CBP/DHS UAS Fire
Support
AZ and NM
April-June, 2011

Small UAS
Evaluation
Playas, NM
Sept 22-23, 2010

Sierra GP-SAR
Evaluation
Ft. Hunter Liggett
Sept 27-30, 2010
December 6-10,
2010



Forest Service UAS Strategic Plan Development

- Develop 3-5 year agency plan for UAS
 - Demonstration/evaluation missions to operational implementation
- Establish technical advisory group
 - Identify applications in the agency that could benefit from UAS
- Mission coordination at the agency level
 - Identify current needs for missions
 - COA submissions, etc.
- UAS missions are currently on hold until plan completion

Small UAS Evaluation (RS-16)

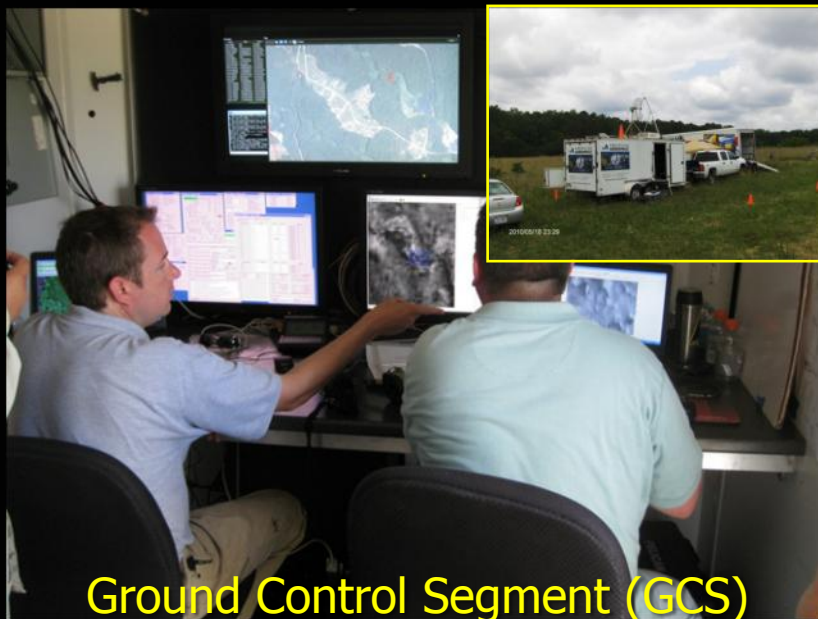
- June 1-2, 2010 at Ft. Pickett, VA and Sept 22-23, 2010 at Playas, NM
- Conducted with AAAI
- Payload:
 - Color video
 - IR video
 - Communications relay
- Goals:
 - Long term imagery/data collection
 - Communications relay for ground based communications
 - Aviation lightning for operational safety



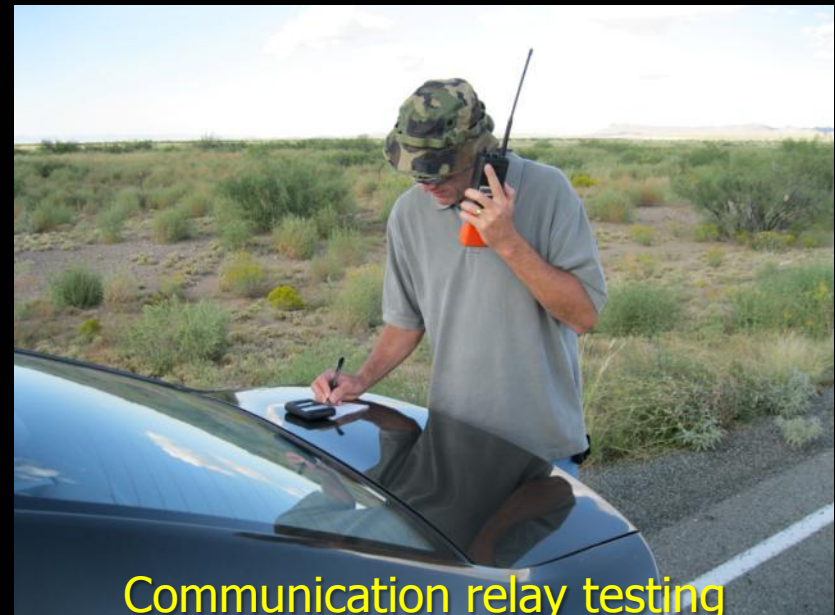
Small UAS Evaluation (RS-16)



Image mosaic w/embedded annotation



Ground Control Segment (GCS)



Communication relay testing

Ground Control Station (GCS)

Most UAS operations can be wholly contained in within the GCS trailer.

Functions include:

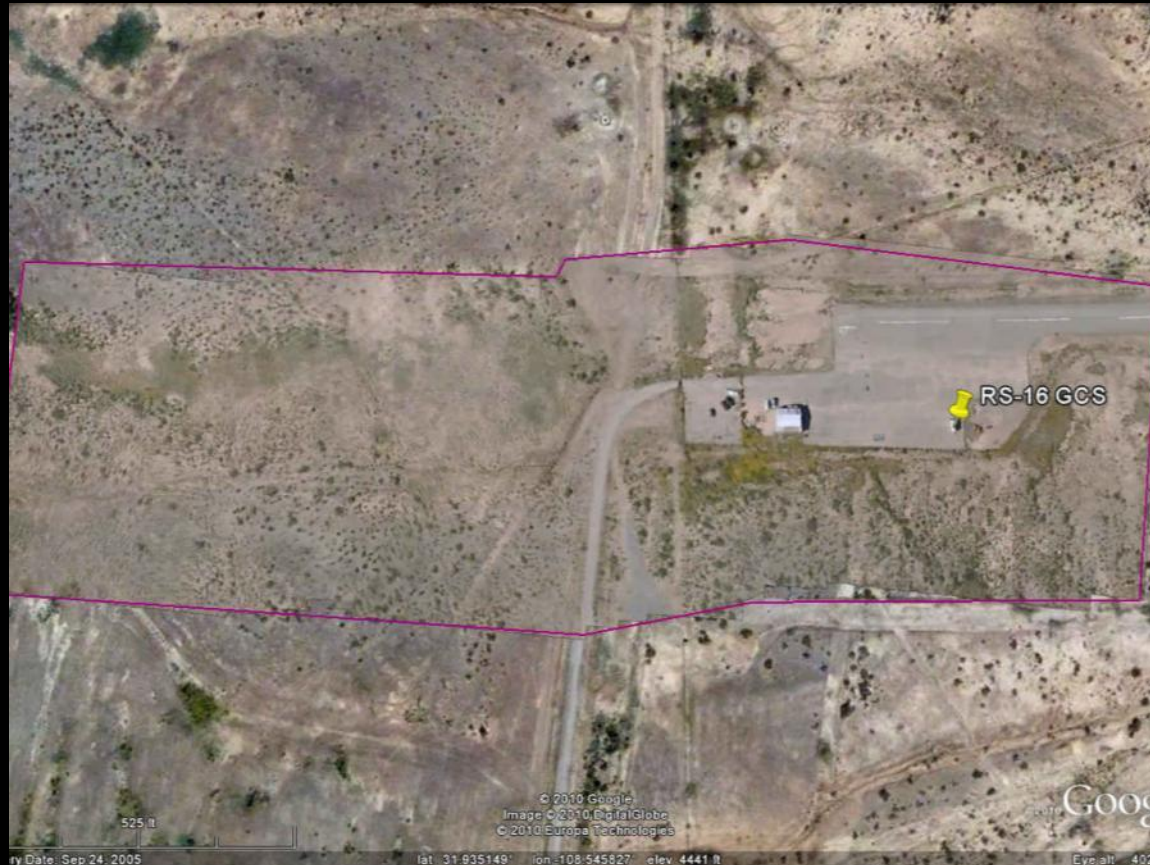
- Transportation
- Command and Control
- Payload Operation
- Image Processing





Image mosaic KMZ

EO image mosaic KMZ with imbedded annotation. Including operations center location and spot fire location with latitude and longitude coordinates.



Video Image Mosaic

Video image mosaic of Playas NM, created by 2D3 TacitView software. Output is a KMZ file. Platform R-16 825 ft AGL 35 degrees FOV.



Super Resolution

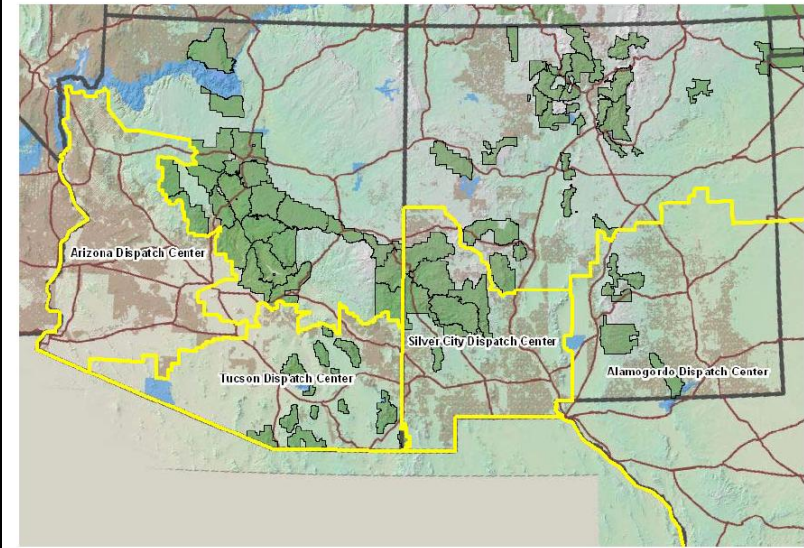
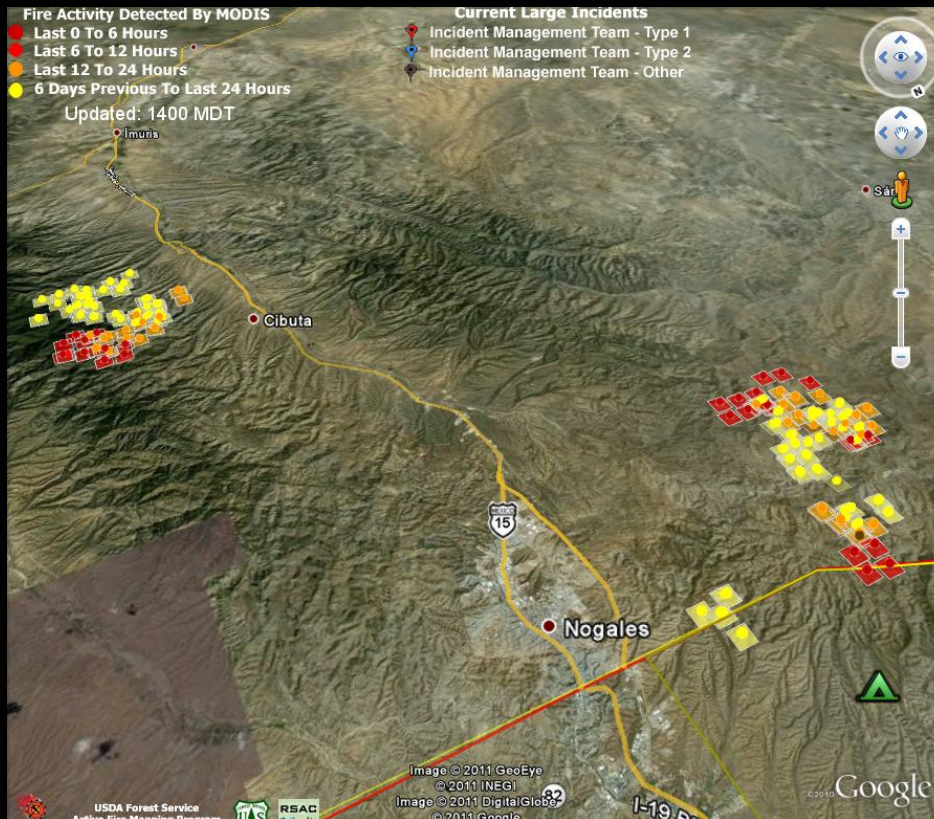
Left is raw image mosaic. Right is the same mosaic with super resolution algorithm applied by TacitView.

CBP/DHS UAS Fire Support

- Coordination between CBP and DOI/Forest Service
- Daily support provided by Ft. Huachuca-based Predator UAS during SW fire season
- Real-time video and maps provided to IMTs via BigPipe and Remote Viewing Terminal (RVT)



"Routine" DHS Support



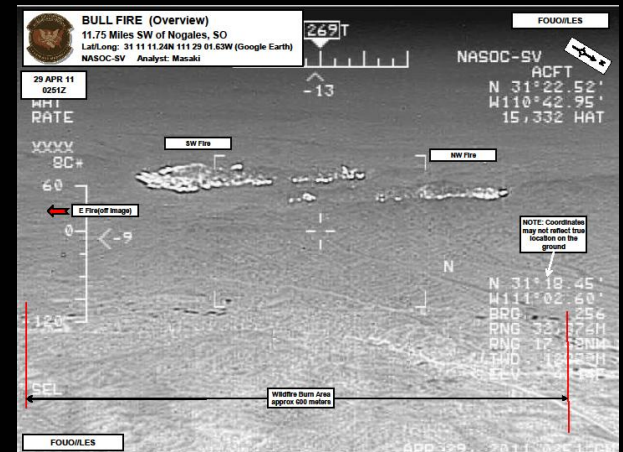
Tucson Interagency Dispatch Center (AZ-TDC) - phone 520-202-2710, 24-hr phone same

Silver City Interagency Dispatch Center (NM-SDC) - phone 575-538-5371/5372, 24-hr phone 1-800-538-1644

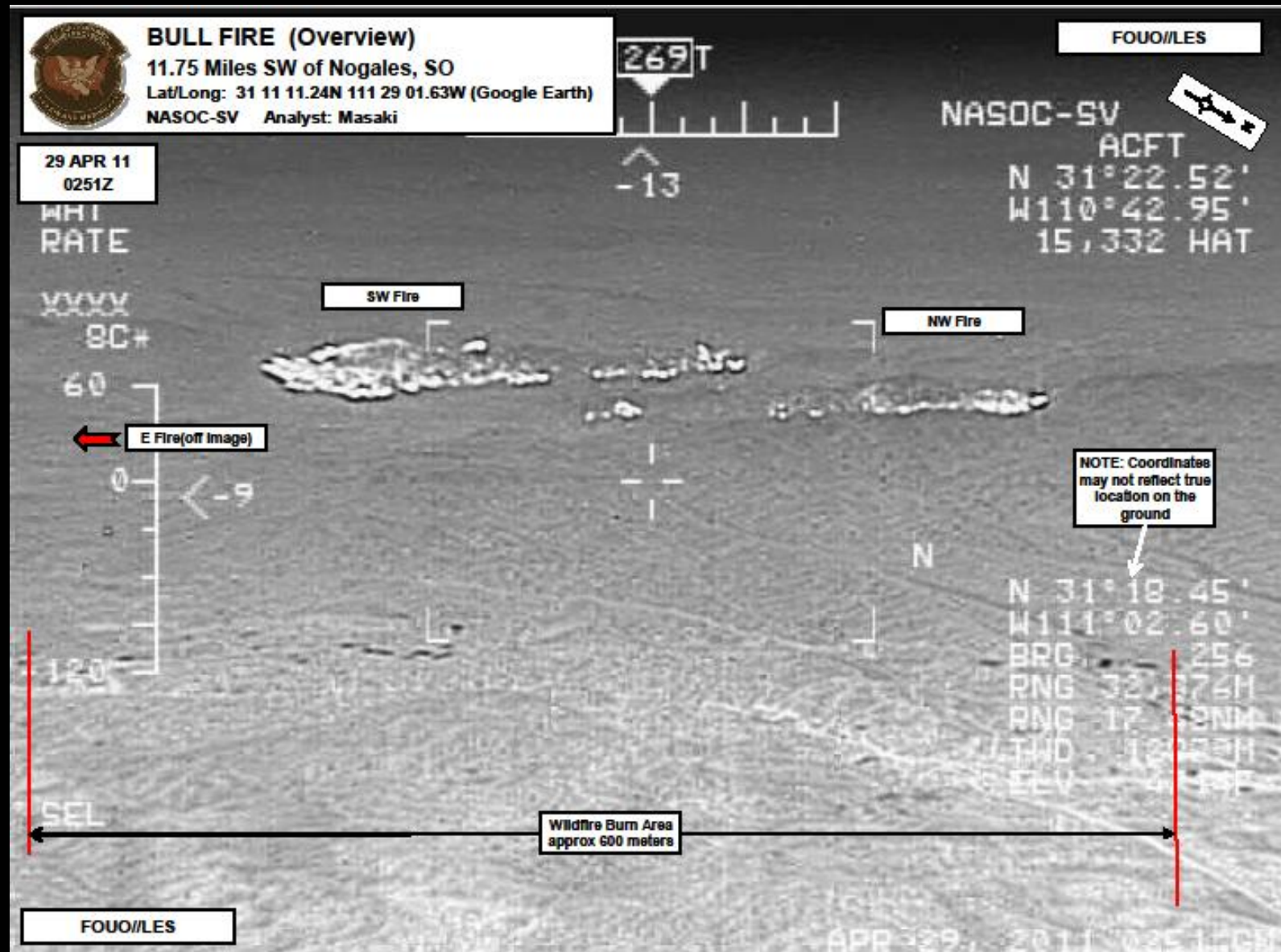
Alamogordo Interagency Dispatch Center (NM-ADC) - phone 575-437-0778, 24-hr phone 575-437-2286

Arizona Interagency Dispatch Center (AZ-ADC) - phone 623-582-0911, 24-hr phone 1-800-309-7081

Aircraft are image fires during scheduled missions



"Routine" DHS Support



2007-2008 Western States Fire Mission

- **Missions aboard the NASA Ikhana UAS:**

- “Ikhana” is a Native-American word from the Choctaw Nation meaning “*intelligent, conscious or aware.*”

- Standard MQ-9 Predator B/Reaper w/o skyball

- **Mission Plan:**

- One LE mission / week
 - 4-5 missions through summer

- **Mission Durations:**

- ~20+ hours

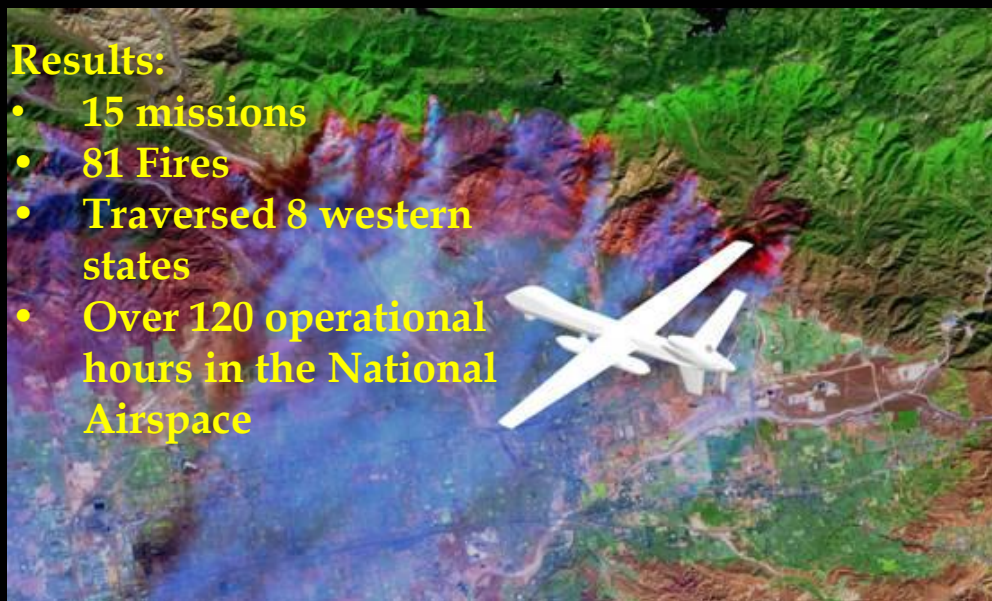
- **Flight Altitude Operations:**

- FL230 (23,000 feet MSL)

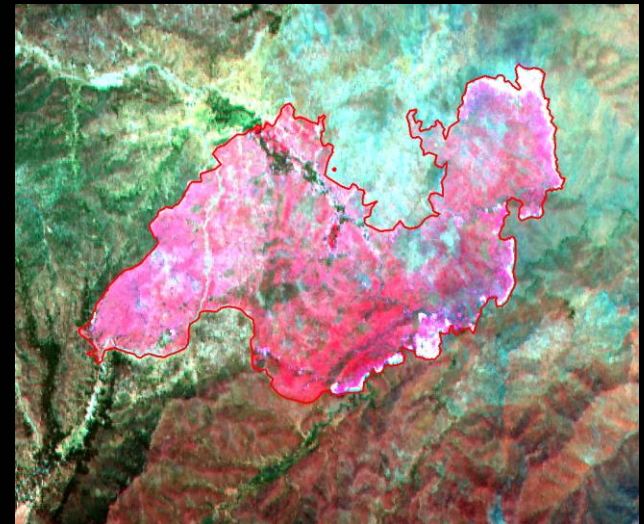
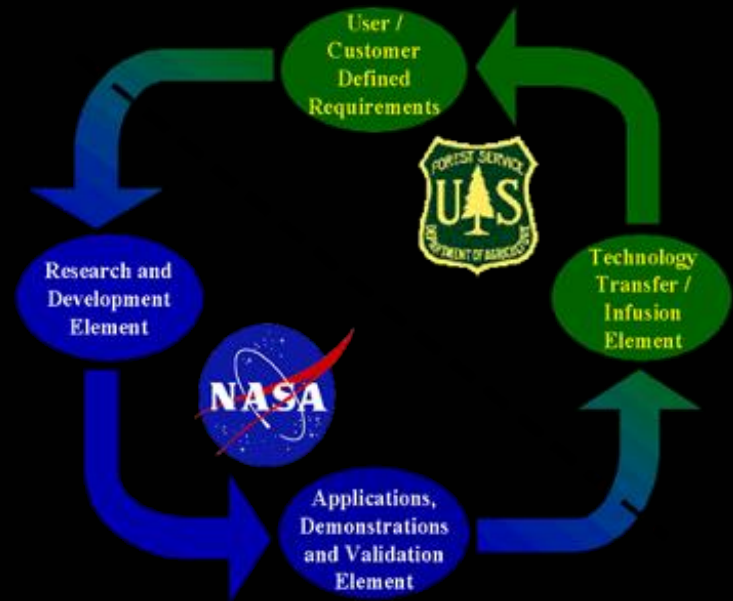


Results:

- 15 missions
- 81 Fires
- Traversed 8 western states
- Over 120 operational hours in the National Airspace



Inter-Agency Tech Transfer/Support 2012



Questions?

